

CLAIMS

1. A multidirectional transmission for a rotary hand-tool comprising:

a drive shaft having a first axis of rotation;

a driven shaft having a second axis of rotation and being rotationally coupled to
5 said drive shaft via at least one universal joint; and

a housing adapted to receive said drive shaft and said driven shaft, and being adapted to allow the axis of rotation of the driven shaft to be adjustably varied relative to the axis of rotation of the drive shaft.
2. A multidirectional transmission according to claim 1, wherein said housing
10 includes an input end adapted to receive said drive shaft and an output end adapted to receive said driven shaft, and said housing is articulated to allow said axis of rotation of the drive shaft to be adjustably varied relative to the axis of rotation of the driven shaft.
3. A multidirectional transmission according to claim 1 or claim 2, wherein said driven shaft and said drive shaft are coupled with said housing to allow vibrational axial
15 translation of said driven shaft and said drive shaft in relation to said housing.
4. A multidirectional transmission according to any one of the preceding claims, wherein said drive shaft is adapted to be detachably rotationally coupled to an output shaft of a rotary hand-tool.
5. A multidirectional transmission according to any one of the preceding claims
20 further comprising one or more intermediate shafts coupled between said drive shaft and said driven shaft.
6. A multidirectional transmission according to claim 5, wherein each intermediate shaft is coupled to an adjacent shaft via a universal joint.

7. A multidirectional transmission according to any one of the preceding claims, wherein said housing includes at least two substantially cylindrical housing elements arranged end to end, said housing elements having a passage formed therethrough lying substantially along a longitudinal axis of the housing and being adapted to receive
5 the transmission shafts.
8. A multidirectional transmission according to claim 7, wherein the housing elements further include a seating surface lying in a plane inclined at oblique angle to the longitudinal axis of the housing element, wherein the relative orientation of adjacent housings elements is adjustable by rotation of the adjacent housing elements about the
10 normal axis to said seating surface.
9. A multidirectional transmission according to claim 8, wherein said seating surface is adapted to abut a corresponding seating surface of an adjacent housing element.
10. A multidirectional transmission according to claim 8 or claim 9, wherein said driven shaft and said drive shaft are articulated with respect to each other such that the
15 pivot axis of said at least one universal joint is located in the plane of said seating surface.
11. A multidirectional transmission according to claim 10, wherein the planes in which the seating surfaces of adjacent housing elements lie form a supplementary angle with each other such that in a first relative orientation the housing elements are
20 coaxial with respect to the longitudinal axes of housing elements.
12. A multidirectional transmission according to any one of claims 7 to 10, wherein the housing comprises at least three housing elements.
13. A multidirectional transmission according to any one of claims 7 to 12, wherein the housing includes a locking means adapted fix one housing element relative to an
25 adjacent housing element to allow the axis of rotation of said drive shaft to be fixed relative to the axis of rotation of said driven shaft at a selected orientation.

14. A multidirectional transmission according to claim 13, wherein said locking means includes a locking nut threadingly engageable with a first housing element and rotationally slidably engaged in relation to an adjacent housing element, wherein upon rotation of said locking nut, the first housing element and the adjacent housing elements
5 are urged toward each other such that the housing elements are fixed relative to each other.

15. A multidirectional transmission according to claim 14, wherein said locking means further includes a retainer member for retaining said locking nut in relation to said adjacent housing element, said locking nut being rotationally slidably engaged with
10 said retainer member, wherein upon rotation of said locking nut said locking nut is advanced toward said first housing element, and said retainer member is urged toward and abutted with said first housing element by said locking nut such that the housing elements are fixed relative to each other.

16. A multidirectional transmission according to claim 15, wherein said locking nut is
15 engaged with said first housing element and said retainer member, and said retainer member is non-detachably engaged with said adjacent housing element in a manner such that upon release of said locking means by rotation of said locking nut, the housing elements are detained in a coupled relationship.

17. A multidirectional transmission according to any one of the preceding claims,
20 further comprising at least one housing extension element detachably engageable with said housing, said housing extension element allowing use of an extended drive shaft and/or use of an extended driven shaft.

18. A multidirectional transmission according to any one of the preceding claims, wherein said housing includes an illumination means for providing light to a work area
25 adjacent the transmission.

19. A multidirectional transmission according to any one of the preceding claims, wherein said housing includes a coolant delivery means for delivering coolant to a work area adjacent the transmission.

20. A multidirectional transmission according to any one of the preceding claims, wherein said drive shaft, said driven shaft, said at least one universal joint and said housing are integrally formed.

21. A multidirectional transmission for a rotary hand-tool comprising:

5 a driven shaft having a first axis of rotation, said driven shaft being rotationally engageable with a drive shaft having a second axis of rotation via at least one universal joint; and

a housing adapted to receive a drive shaft and said driven shaft, and being adapted to allow the axis of rotation of the driven shaft to be adjustably varied relative to
10 the axis of rotation of the drive shaft.

22. A multidirectional transmission according to claim 21, wherein said driven shaft and said drive shaft are coupled with said housing to allow vibrational axial translation of said driven shaft and said drive shaft in relation to said housing.

23. A multidirectional transmission according to claim 21 or claim 22, further
15 comprising an intermediate drive shaft adapted to be located between the drive shaft of the hand-tool and said at least one universal joint.

24. A rotary hand-tool having a multidirectional transmission including:

a driven shaft having a first axis of rotation, said driven shaft being rotationally engaged via at least one universal joint with the drive shaft of the hand-tool having a
20 second axis of rotation; and

a housing adapted to receive said drive shaft and said driven shaft, and being adapted to allow the axis of rotation of the driven shaft to be adjustably varied relative to the axis of rotation of the drive shaft.

25. A rotary hand-tool according to claim 24, wherein said driven shaft and said drive shaft are coupled with said housing to allow vibrational axial translation of said driven shaft and said drive shaft in relation to said housing.
26. A rotary hand-tool according to claim 24 or claim 25, wherein the hand-tool is
5 driven by electrical, pneumatic, hydraulic or manual means, and is adapted to drive a rotationally driveable device including a screw, a bolt, a nut, a fastener, a stud or a drill bit.
27. A rotary hand-tool according to any one of claims 24 to 26, wherein the rotary hand-tool includes a bi-directional drive device.
- 10 28. A rotary hand-tool according to any one of claims 24 to 27, wherein the rotary hand-tool includes an axial vibrational drive.
29. A rotary hand-tool according to any one of claims 24 to 28, wherein said transmission includes an engagement means for engagement with a tool bit.
30. A rotary hand-tool according to any one of claims 24 to 29, wherein said housing
15 is formed integrally with the rotary hand-tool.
31. A multidirectional transmission for a rotary hand-tool substantially as herein described with reference to the accompanying drawings.
32. A rotary hand-tool substantially as herein described with reference to the accompanying drawings.